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LITEMAX DLF/DLH0868
Sunlight Readable 8.4" LED B/L LCD

User Manual

(1st Edition 2012/3/23)
All information is subject to change without notice.

Approved by	Checked by	Prepared by

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RECORD OF REVISION

Version and Date	Page	Old Description	New Description	Remark
Mar,23,2012	all		Initial Release	

Contents

1.0 GENERAL DESCRIPTION

DLF/DLH0868 is a color TFT-LCD Display as active switching devices with 1,600nits LED backlight powered by Durapixel™ technology. This LCD display has a 8.4 inch diagonally measured active area with SVGA resolutions (800 horizontal by 600 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.2M colors.

1.1 FEATURES

- Sunlight Readable
- LED Backlight
- High Shock & Vibration Resistance
- Low Power Consumption
- High Uniformity
- Low EMI Noise
- Wide Dimming
- Life Expectancy
- Wide Operation Temperature

1.2 GENERAL SPECIFICATIONS

Model No.	DLF0868	DLH0868
Description	8.4" TFT LCD, LED Backlight 1600 nits, SVGA	
Display Area (mm)	170.4(H) x 127.8(V)	
Brightness	1600 cd/m^2	
Resolution	SVGA (800 x 600)	
Contrast Ratio	600 : 1	
Pixel Pitch (mm)	0.213 x 0.213	
Viewing Angle	160°(H), 140°(V)	
Display Colors	16.2M / 262K	
Response Time (Typical)	35 ms	
Sync	LVDS	
Power Consumption	5.6W	
Dimensions (mm)	203.0(W) x 142.5(H) x 5.7(D)	
Weight (Net)	0.2Kg	

1.3ABSOLUTE MAXIMUM RATINGS

Absolute Ratings of TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive	VDD	-0.3	+3.6	[Volt]	

Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit
Operating Temperature	TOP	-20	70	[^{0}C]
Operation Humidity	HOP	5	90	[%RH]
Storage Temperature	TST	-20	70	[^{0}C]
Storage Humidity	HST	5	90	[%RH]

Note: Maximum Wet-Bulb should be 39℃ and no condensation.

2.0 Electrical Characteristics

LCD Module Power Specification

Power Specification

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	±10%
IDD	VDD Current	-	300	TBD	[mA]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
Irush	LCD Inrush Current	-	-	TBD	[A]	Note 1
PDD	VDD Power	-	1	TBD	[Watt]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)

Note 1: Measurement condition:

VDD rising time

64 Gray pattern
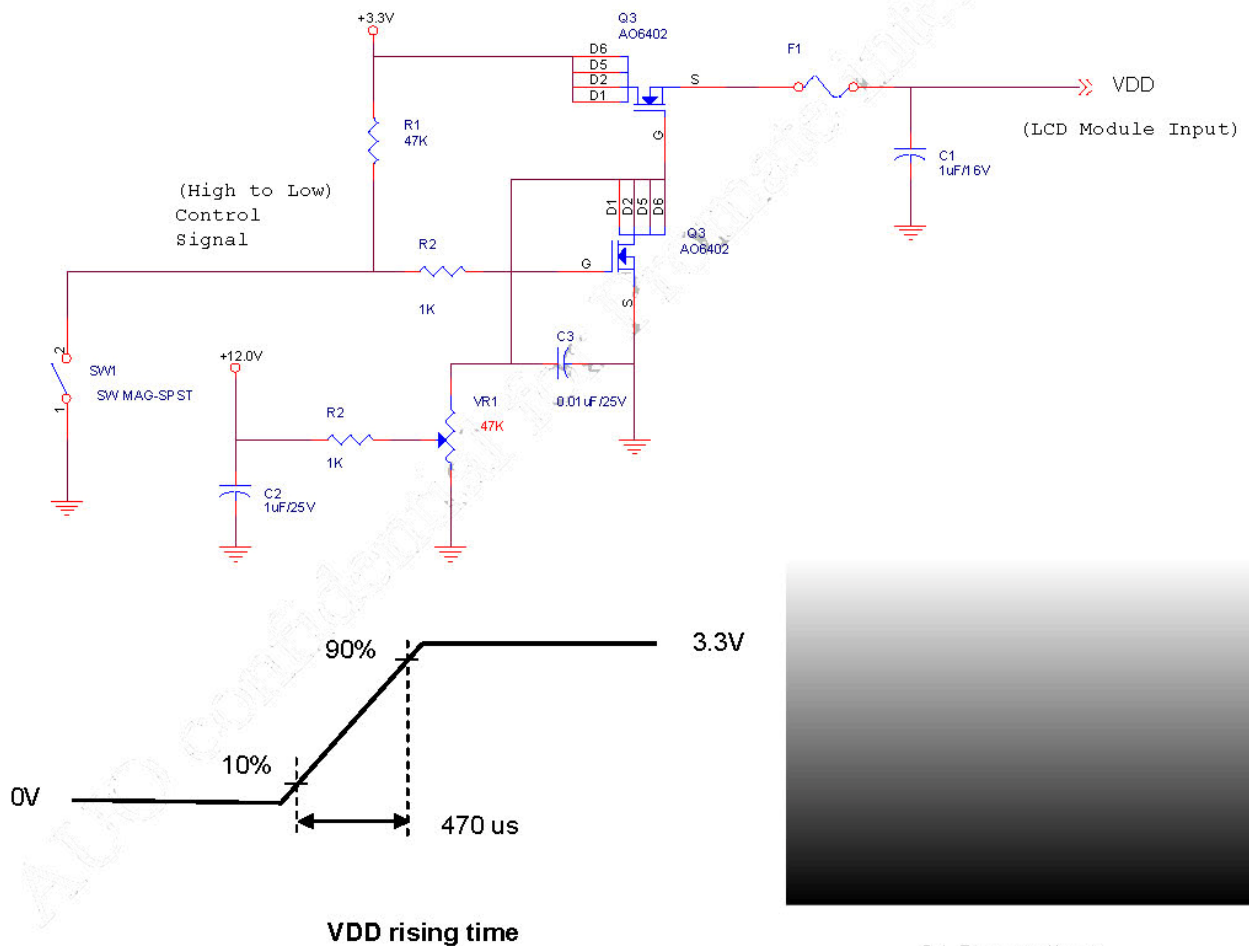
Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	[mV]	VICM=1.2V
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VICM=1.2V
|VID|	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.1		1.6	[V]	VTH/VTL=±100mV

Note: LVDS Signal Waveform.
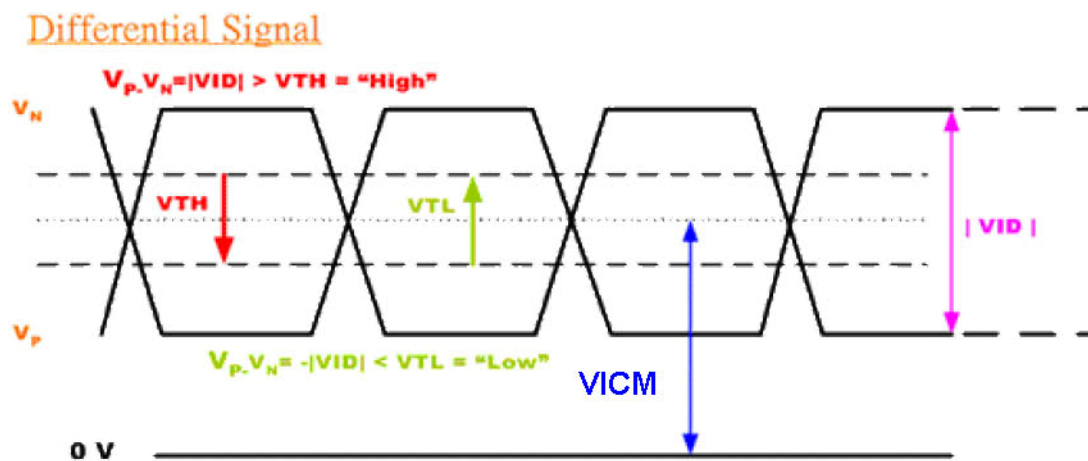
Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.

Signal Description

LVDS is a differential signal technology for LCD interface and high speed data transfer device. The connector pin definition is as below.

Pin No.	Symbol	Description
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	UD	Vertical Reverse Scan Control, Low or NC → Normal Mode. High → Vertical Reverse Scan.Note
4	LR	Horizontal Reverse Scan Control, Low or NC → Normal Mode. High → Horizontal Reverse Scan.Note
5	RxIN1-	LVDS differential data input Pair 0
6	RxIN1+	
7	GND	Ground
8	RxIN2-	LVDS differential data input Pair 1
9	RxIN2+	
10	GND	Ground
11	RxIN3-	LVDS differential data input Pair 2
12	RxIN3+	
13	GND	Ground
14	RxCLKIN-	LVDS differential Clock input Pair
15	RxCLKIN+	
16	GND	Ground
17	SEL 68	LVDS 6/8 bit select function control, Low or NC → 6 Bit Input Mode. High → 8 Bit Input Mode. Note
18	NC	NC
19	RxIN4-	LVDS differential data input Pair 3. Must be NC in 6 bit input mode.
20	RxIN4+	

Note   : "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected."

The Input Data Format

SEL68

SEL68 = "Low" or "NC" for 6 bits LVDS Input

RxCLKIN

| RxIN1 | G0 | R5 | R4 | R3 | R2 | R1 | R0 |

| RxIN2 | B1 | B0 | G5 | G4 | G3 | G2 | G1 |

| RxIN3 | DE | VS | HS | B5 | B4 | B3 | B2 |
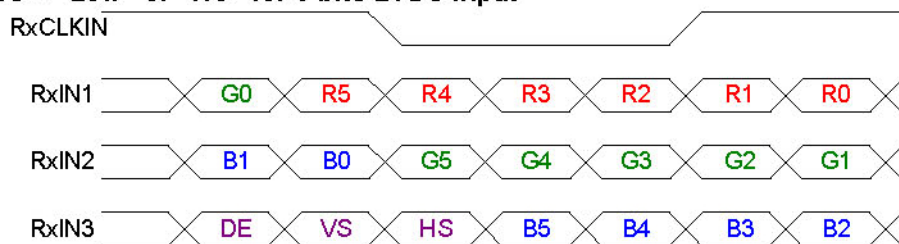
SEL68 = "High" for 8 bits LVDS Input

RxCLKIN

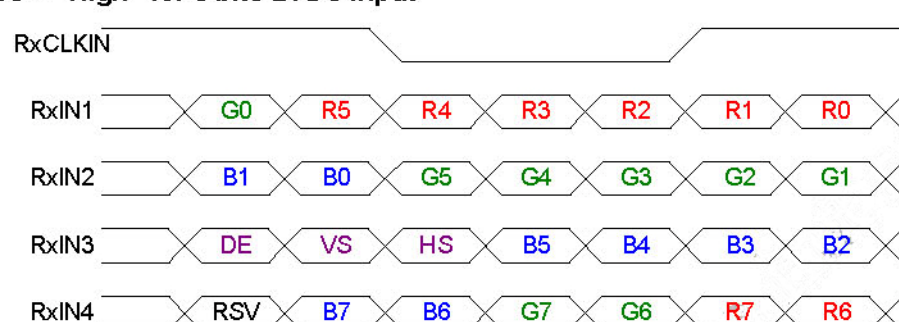| RxIN1 | G0 | R5 | R4 | R3 | R2 | R1 | R0 |

| RxIN2 | B1 | B0 | G5 | G4 | G3 | G2 | G1 |

| RxIN3 | DE | VS | HS | B5 | B4 | B3 | B2 |

| RxIN4 | RSV | B7 | B6 | G7 | G6 | R7 | R6 |

Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data
R6	Red Data 6	Each red pixel's brightness data consists of these
R5	Red Data 5	8 bits pixel data.
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data
G6	GreenData 6	Each green pixel's brightness data consists of these
G5	GreenData 5	8 bits pixel data.
G4	GreenData 4	
G3	GreenData 3	
G2	GreenData 2	
G1	GreenData 1	
G0	GreenData 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data
B6	Blue Data 6	Each blue pixel's brightness data consists of these
B5	Blue Data 5	8 bits pixel data.
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

Interface Timing

Timing Characteristics
DE mode only

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency		$1/T_{Clock}$	33.6	39.8	48.3	MHz	
Vertical Section	Period	T_V	608	628	650	T_H	
	Active	T_{VD}	600	600	600		
	Blanking	T_{VB}	8	28	50		
Horizontal Section	Period	T_H	920	1056	1240	T_{Clock}	
	Active	T_{HD}	800	800	800		
	Blanking	T_{HB}	120	256	440		

Note: Frame rate is 60 Hz.
Note: DE mode.

Input Timing Diagram
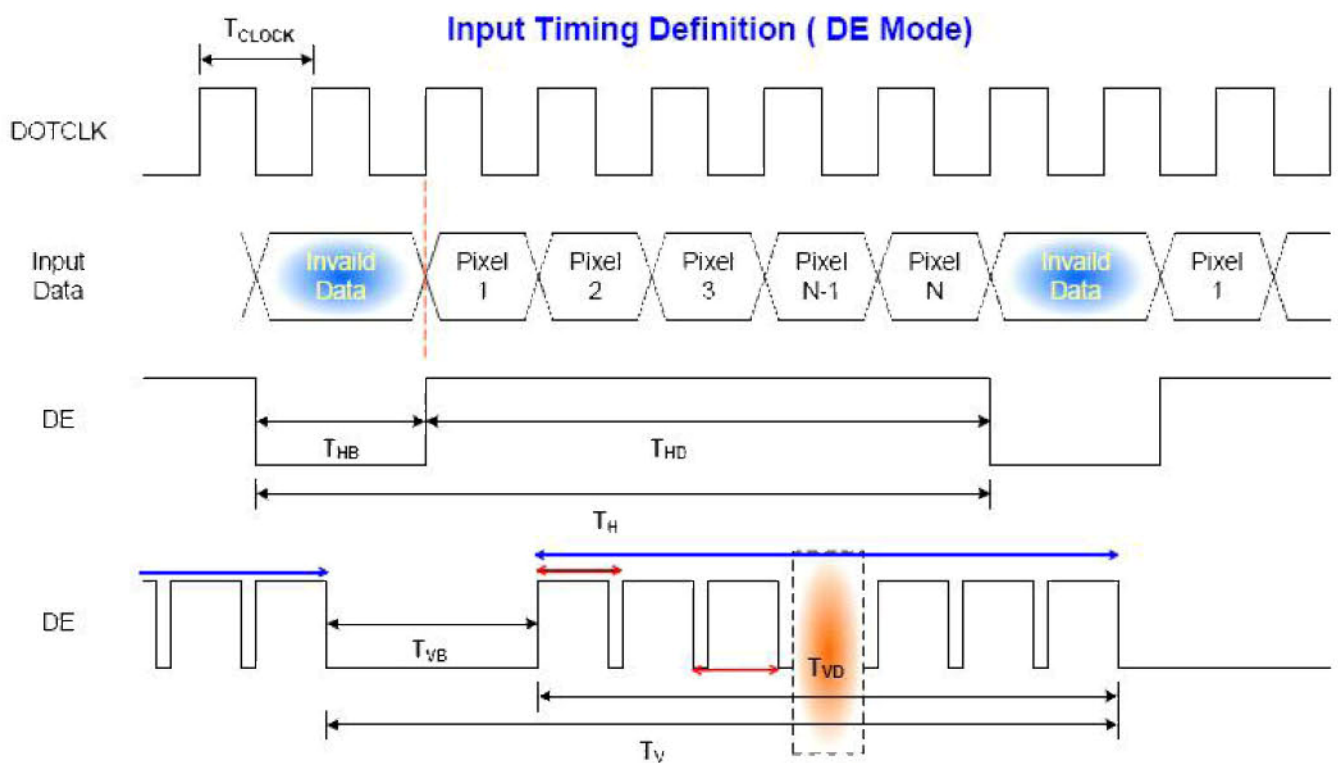
Power ON/OFF Sequence

VDD power and lamp on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.

Power ON/OFF sequence timing

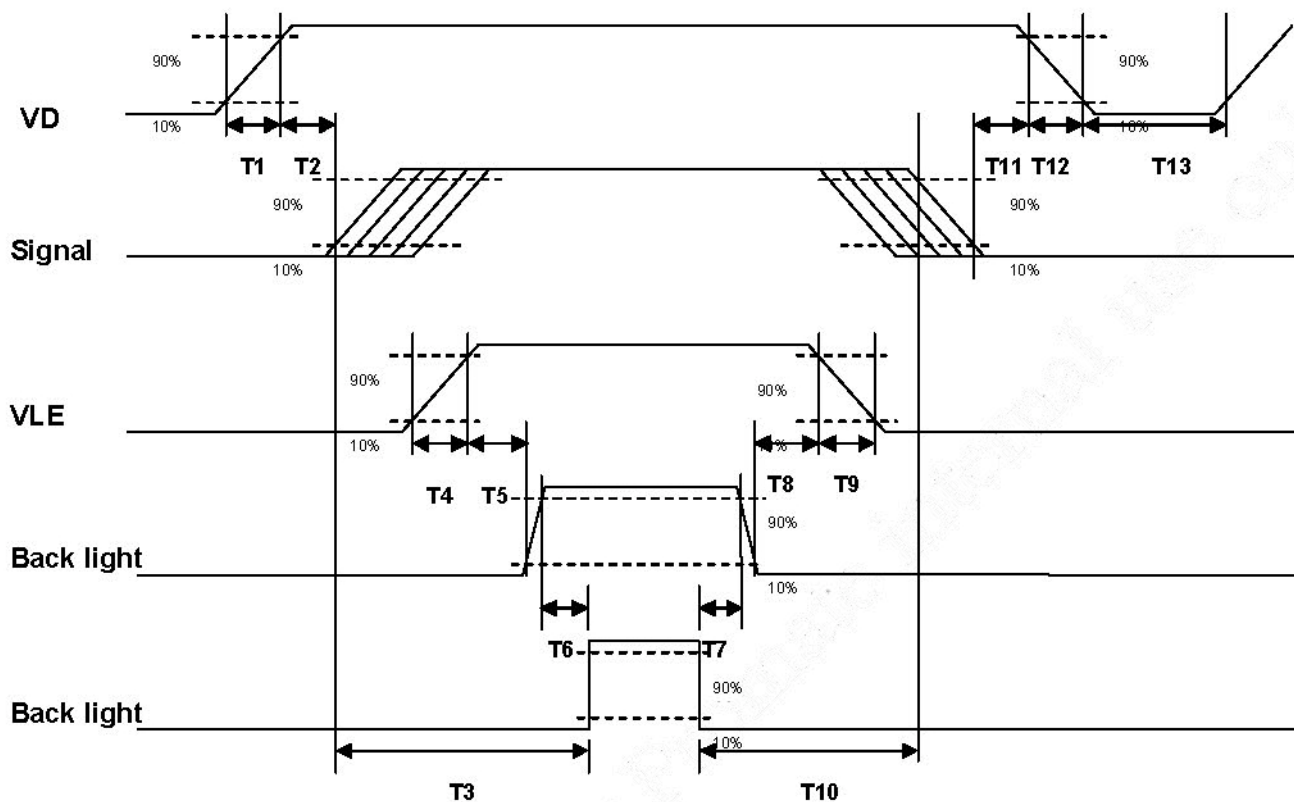| Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0	16	50	[ms]
T12	-	-	10	[ms]
T13	1000	-	-	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

TFT LCD Module: LVDS Connector

Connector Name / Designation	Signal Connector
Manufacturer	STM
Connector Model Number	MSB24013P20 or compatible.
Adaptable Plug	P24013P20 or compatible.

Pin No.	Signal Name	Pin No.	Signal Name
1	VDD	2	VDD
3	UD	4	LR
5	RxIN1-	6	RxIN1+
7	GND	8	RxIN2-
9	RxIN2+	10	GND
11	RxIN3-	12	RxIN3+
13	GND	14	RxCKIN-
15	RxCKIN+	16	GND
17	SEL 68	18	NC
19	RxIN4-	20	RxIN4+

5.0 OPTICAL SPECIFICATION

Optical

Item		Symbol	Condition	Data	Unit	Note
Color chromaticity	Red	Rx	θ x=0 θ y=0 BM-7	0.5871	-	Test Mode： （1）（2）（3）
		Ry		0.3157	-	
	Green	Gx		0.3737	-	
		Gy		0.5828	-	
	Blue	Bx		0.1496	-	
		By		0.1031	-	
	White	Wx		0.3250	-	
		Wy		0.3465	-	
Center Luminance of White		Lc		1600	cd/㎡	
Average		La		1499	cd/㎡	
Uniform		Lu		80	％	
Contrast Ratio		CR	θ x=0 θ y=0 Klein K-10	600 : 1	-	Test Mode： （1）（4）
Color Saturation		NTSC		61.36	％	
Viewing Angle	Horizontal	θ x+	CR≧10	80	Deg	Test Mode： （1）（3）
		θ x-		80		
	Vertical	θ y+		80		
		θ y-		60		

Test Mode：

（**1**） Definition of Viewing Angle（θx，θy）：
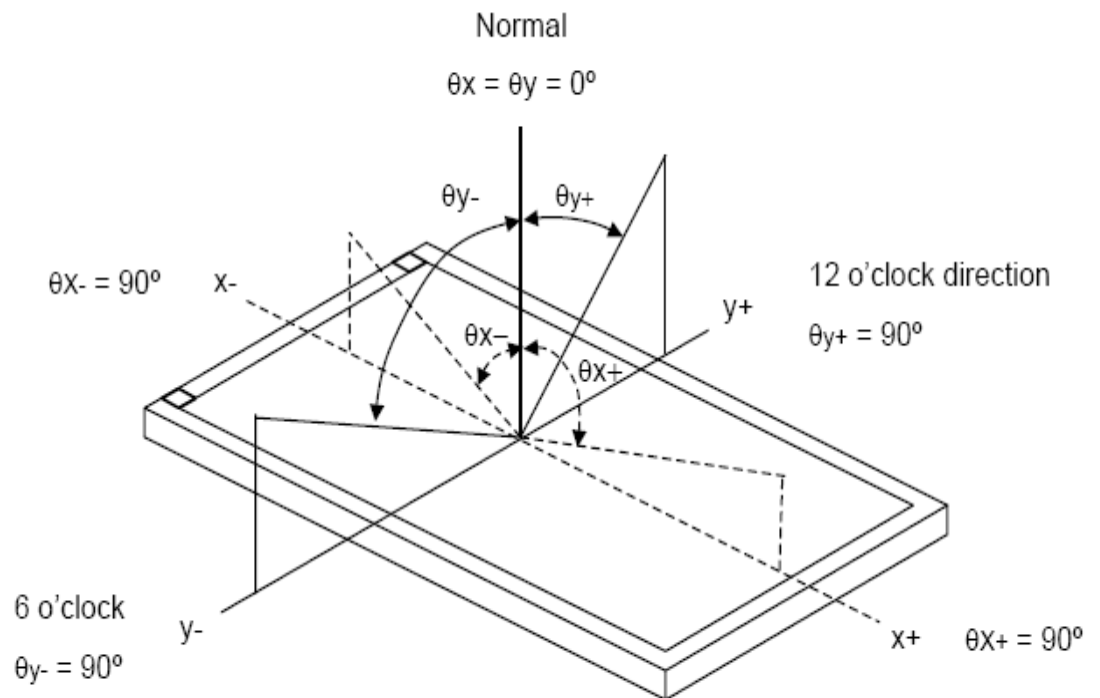
（**2**） Definition of Test Point：
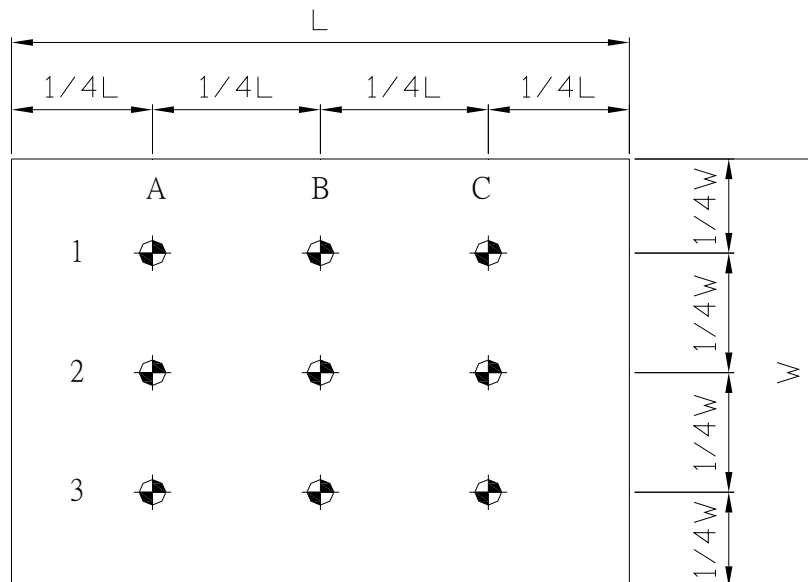
Active Area

（**3**）BM-7 Measurement Setup:

LCD Module

LCD Panel

Center of the Screen

BM-7

Field of View = 2°

500 mm

Light Shield Room
(Ambient Luminance < 2 lux)
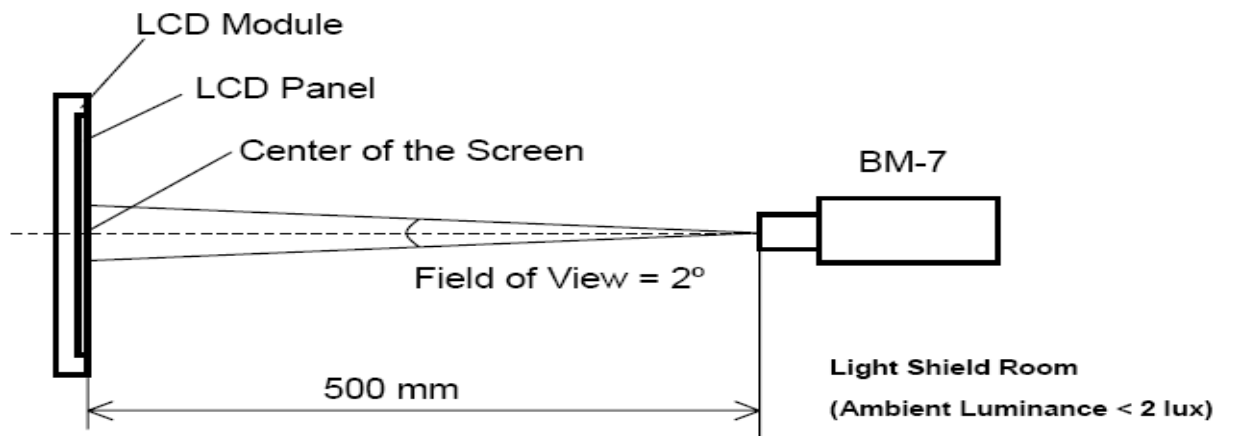
（**4**）Klein K-10 Measurement Setup:

LCD Module

LCD Panel

Center of the Screen

Klein K-10
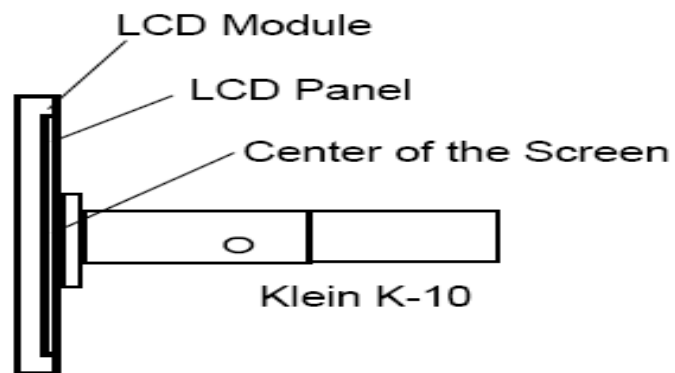
6.0 LED DRIVING BOARD SPECIFICATIONS

1. LED Application
   This specification is applied to LED converter unit for DLF/DLH0868 (1600nit) LED backlight

2. Operating Characteristics

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		10.0	12.0	14.0	V	
Input Current (Low Brightness)	IinL	VIN=12V,Vadj=5V	3	-----	-----	mA	
Input Current (High Brightness)	IinH	VIN=12V,Vadj=0V	0.572	0.478	0.411	A	
LED Current (Low Brightness)	IoutL	VIN=12V,Vadj=5V	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	VIN=12V,Vadj=0V	0.22	0.22	0.22	A	
Working Frequency	Freq	VIN=12V,Vadj=0V	523	550	580	KHz	
PWM Frequency	Freq	VIN=12V	180	200	220	HZ	
Brightness Control	Vadj	Connection of Voltage	0.5	-----	4.8	V	Vadj±5%
ON/OFF Control	Von/off	Normal Operation	2	-----	5	V	
Output Voltage	Vout	VIN=12V,Vadj=0V	24.438	24.409	24.397	V	
Efficiency	η	VIN=12V,Vadj=0V	93.99	93.62	93.28	%	

3. Connector Socket

3-1. Input Connector: J3(JST S 8B-PH-SM3-TB or Compatible

PIN No	Symbol	Description
1	Vin	DC+12V
2	Vin	DC+12V
3	Vin	DC+12V
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	Brightness	Brightness Control 5V~0V
8	Control	ON/OFF Control 0.8V(OFF) 2~5V(ON)

3-2 .Output Connector: J1,J2(JST S 2B-ZR-SM3A-TF or Compatible)

PIN NO	Symbol	Description
1	Output	LED High Voltage(+)
2	Output	LED Low Voltage (-)

4. Mechanical Characteristics
Dimension: 70mm*30mm*7mm

INPUT CONNECTOR
J3:
      PIN1:VIN
      PIN2:VIN
      PIN3:VIN
      PIN4:GND
      PIN5:GND
      PIN6GND
      PIN7:BRIGHTNESS
      PIN8:ON/OFF

30.00mm

70.00mm

7mm
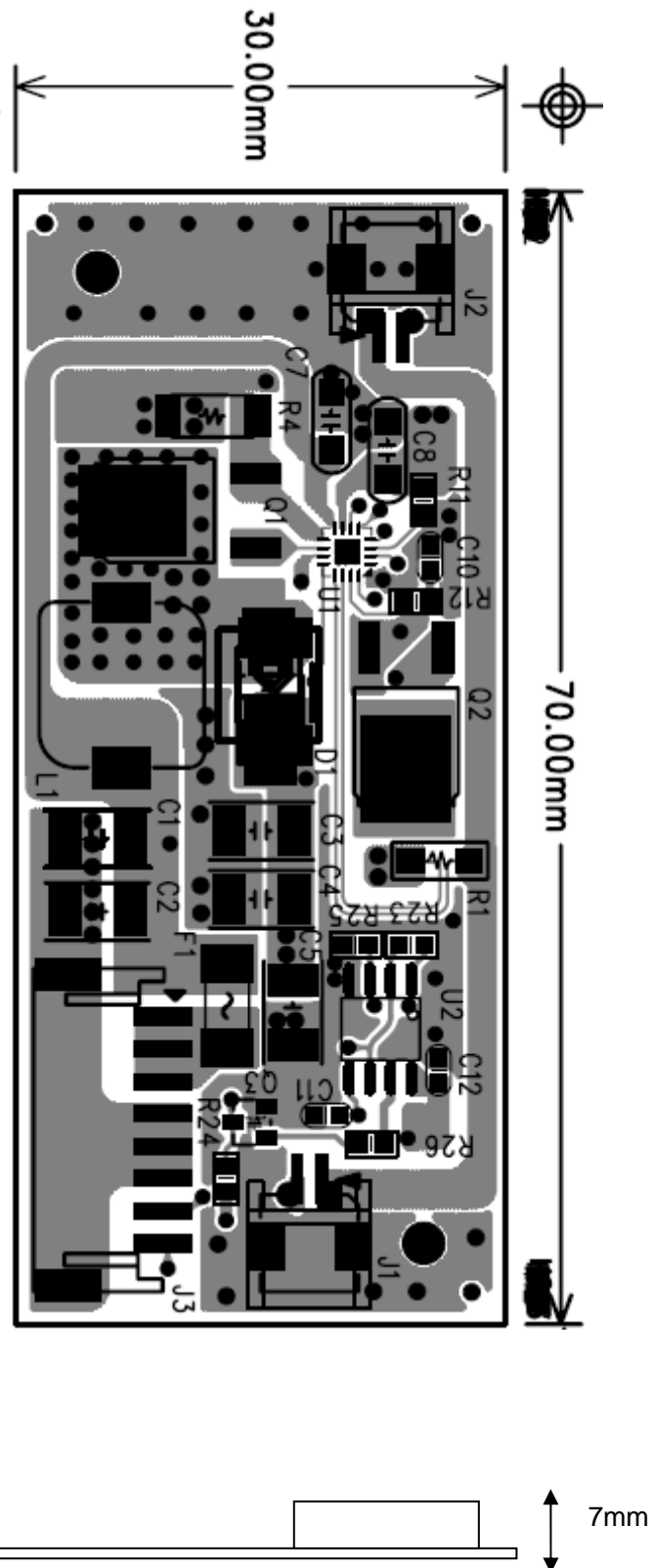
7.0 AD5621GD SPECIFICATION (DLH0868 Only)

We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has options of external luminance sensor, a surface mounted VR button to control the brightness, fan rotation and thermal sensor. The rev.1 has released for European RoHS Compliant purpose.

General Description

- Max Resolution Up To WXGA 60Hz
- LVDS Output
- Support Panel DC5V or 3.3V, 12V Output
- External Fan Control by Software
- OSD Control
- Inverter 0~5V Dimming Control
- 2Wx2 Audio Output
- Input Power 12V
- Analog signal Input (RGB)
- *External V.R. brightness control
- *External light sensor brightness control

Supported Timing (*by your panel resolution)

The following table displays optimum quality modes that the LCD monitor provides. If the other video modes are used, the monitor will stop working or display a poor quality picture.

TIMMING MODE	RESOLUTION
VGA	640x480@60Hz
	640x480@72Hz
	640x480@75Hz
SVGA	800x600@56Hz
	800x600@60Hz
	800x600@72Hz
	800x600@75Hz
XGA	1024x768@60Hz
	1024x768@70Hz
	1024x768@75Hz
SXGA	1280x1024@60Hz
	1280x1024@70Hz
	1280x1024@75Hz
WXGA	1366x768@60Hz

Release Model: AD5621GD

AD5621-GD
├──────── DVI
└──────── Basic VGA Input (analog in)

LVDS 30pin
connector

Fan2
(12v)

5v/12v
power for touch

Panel voltage selection
33v/5v/12v

Fan1
(12v)

Inverter
connector

Auto dimming
Light sensor

Potential meter
Dimming (option)

OSD Keypad

DC12v
optional
connector

DVI

D-sub
15 VGA
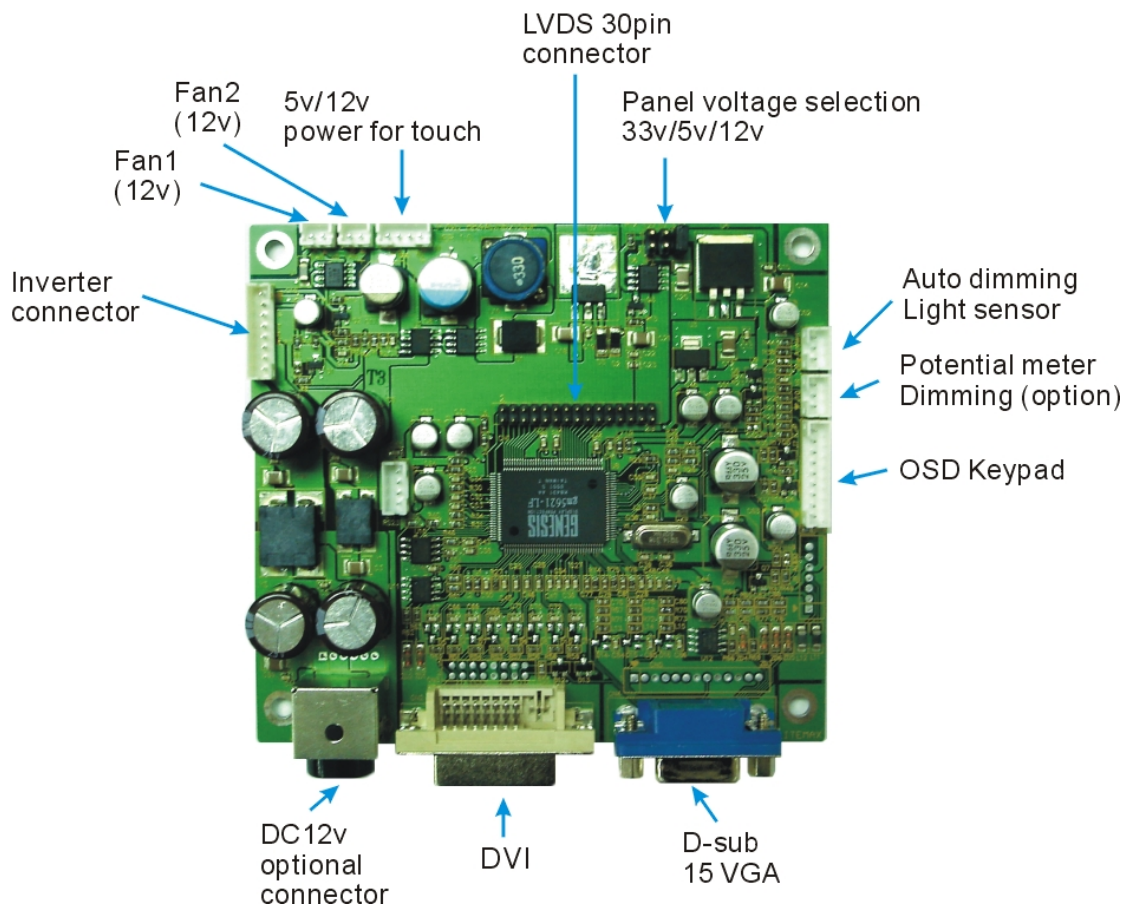
Outline Dimensions

unit:mm
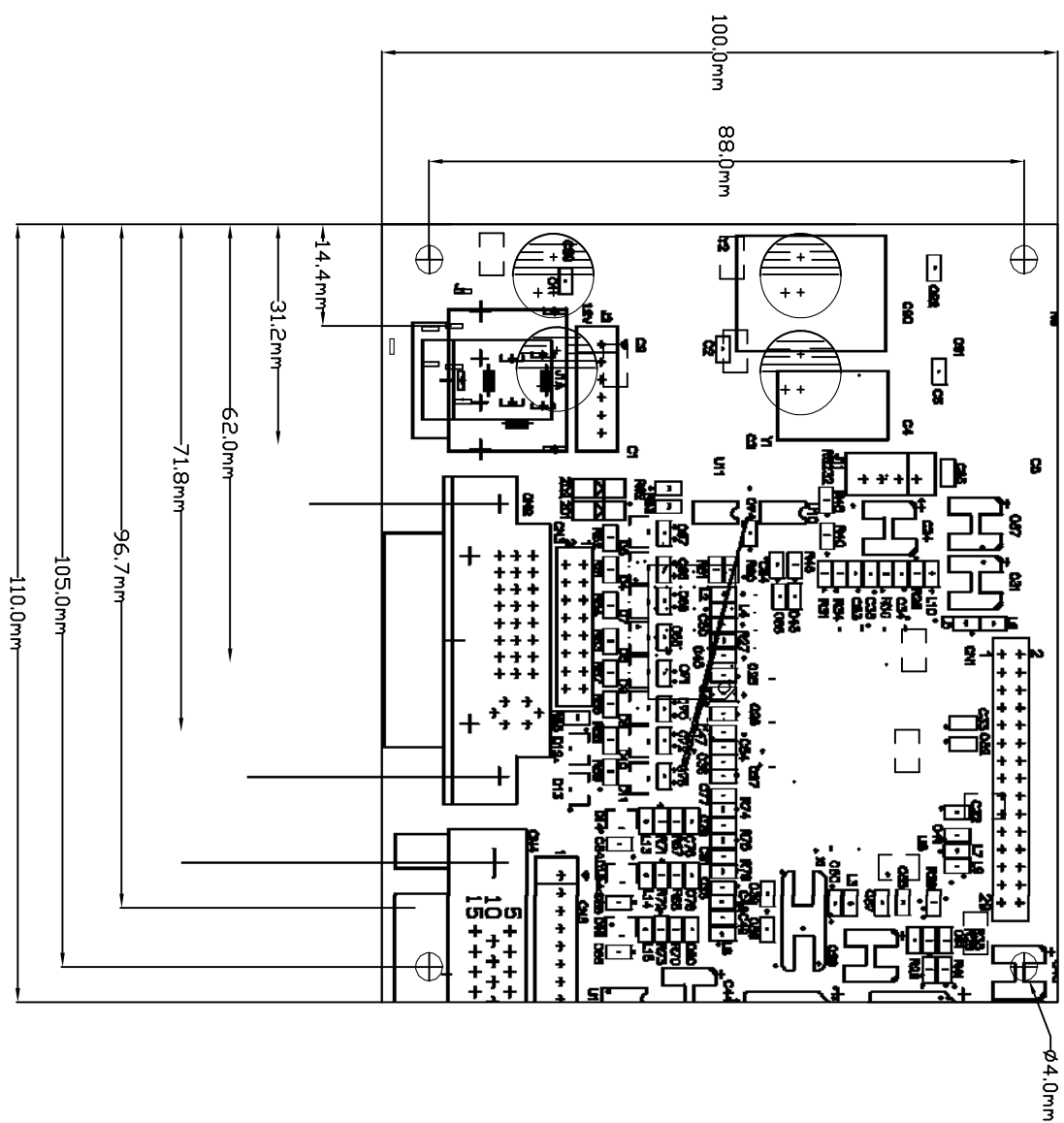
Pin Define
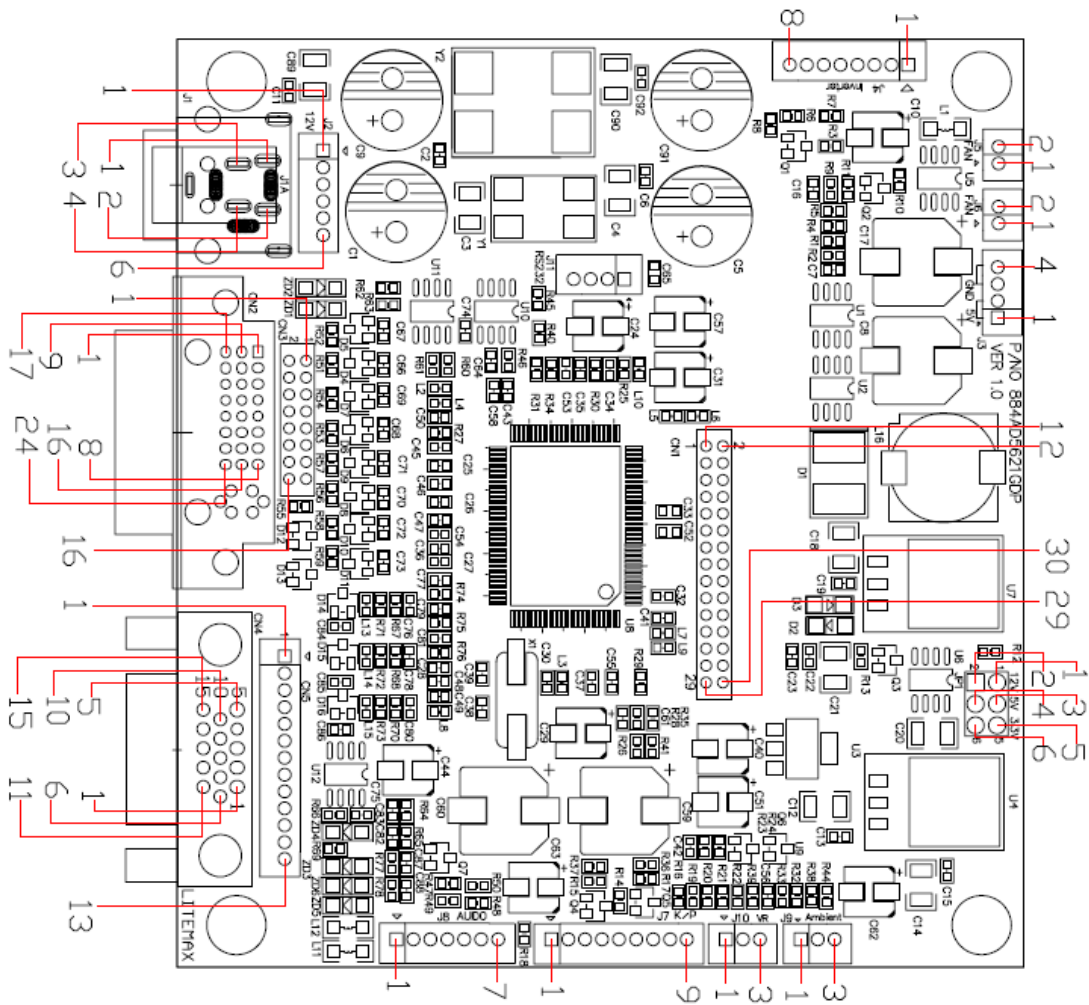
CN1: Panel connector

Pin No.	Function	Pin No.	Function
1	RxO0+	16	RxE1-
2	RxO0-	17	RxE2+
3	RxO1+	18	RxE2-
4	RxO1-	19	RxEC+
5	RxO2+	20	RxEC-
6	RxO2-	21	RxE3+
7	RxOC+	22	RxE3-
8	RxOC-	23	GND
9	RxO3+	24	GND
10	RxO3-	25	GND
11	GND	26	GND
12	GND	27	PANEL-VCC
13	RxE0+	28	PANEL-VCC
14	RxE0-	29	PANEL-VCC
15	RxE1+	30	PANEL-VCC

CN2: DVI-D Input connector

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	T.M.D.S. Data2-	9	T.M.D.S. Data1-	17	T.M.D.S. Data0-
2	T.M.D.S. Data2+	10	T.M.D.S. Data1+	18	T.M.D.S. Data0+
3	T.M.D.S. Data2/4 Shield	11	T.M.D.S Data1/3 Shield	19	T.M.D.S. Data0/5 Shield
4	T.M.D.S. Data4-	12	T.M.D.S. Data3-	20	T.M.D.S. Data5-
5	T.M.D.S. Data4+	13	T.M.D.S. Data3+	21	T.M.D.S. Data5+
6	DDC Clock	14	+5V Power	22	T.M.D.S. Clock Shield
7	DDC Data	15	Ground (for +5V)	23	T.M.D.S. Clock+
8	Not Connected	16	Hot Plug Detect	24	T.M.D.S. Clock-

CN3: DVI-D Input connector(16pin connector)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	T.M.D.S.	7	DDC Data	13	GND
2	T.M.D.S.	8	DDC Clock	14	GND
3	T.M.D.S.	9	GND	15	Hot Plug Detect
4	T.M.D.S.	10	GND	16	+5V Power
5	T.M.D.S.	11	T.M.D.S. Clock-		
6	T.M.D.S.	12	T.M.D.S. Clock+		

CN4: Analog RGB Input connector(D-SUB 15Pin)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	RED	Analog Red	9	NC	+5VDC
2	GREEN	Analog Green	10	SGND	Sync GND
3	BLUE	Analog Blue	11	NCD	Reserved
4	GND	Reserved	12	SDA	DDC Serial Data
5	NC	VGA_CAB	13	HSYNC	Horizontal Sync
6	RGND	Red Return	14	VSYNC	Vertical Sync
7	GGND	Green Return	15	SCL	DDC Data Clock
8	BGND	Blue Return			

CN5: Analog RGB Input connector(13pin connector)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	SCL	DDC Data Clock	8	RED	Analog Red
2	SDA	DDC Serial Data	9	GGND	Green Return
3	GND	Reserved	10	GREEN	Analog Green
4	NC	VGA_CAB	11	BGND	Blue Return
5	VSYNC	Vertical Sync	12	BLUE	Analog Blue
6	HSYNC	Horizontal Sync	13	NC	+5VDC
7	RGND	Red Return			

J1: Power DIN Jack(12V)

Pin No.	Function	Pin No.	Function
1	12VDC	2	12VDC
3	GND	4	GND

J2: Power connector(12V)

Pin No.	Function	Pin No.	Function
1	12VDC	4	GND
2	12VDC	5	GND
3	12VDC	6	GND

J3: Power connector(5V)

Pin No.	Function	Pin No.	Function
1	5VDC	2	5VDC
3	GND	4	GND

J4: Inverter Connector

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	ON/OFF	Backlight ON/OFF	5	GND	GND
2	BRIGHT	Dimming adjust	6	12VDC	Input 12VDC
3	GND	GND	7	12VDC	Input 12VDC
4	GND	GND	8	12VDC	Input 12VDC

J5,J6: FAN

Pin No.	Function	Pin No.	Function
1	FAN(+)	2	GND

J7: Key Pad

Pin No.	Function	Pin No.	Function
1	POWER KEY	6	MENU KEY
2	GREEN LED	7	AUTO KEY
3	RED LED	8	GND
4	LEFT KEY	9	GND
5	RIGHT KEY		

J8: TO Audio PCB connector(Audio control)

Pin No.	Function	Pin No.	Function
1	12VDC	5	5VDC
2	12VDC	6	Volume
3	GND	7	Mute
4	GND		

J9: Ambient

Pin No.	Function	Pin No.	Function
1	NC	3	GND
2	L_Sensor		

J10: VR connector

Pin No.	Function	Pin No.	Function
1	3,3VDC	2	VR
3	GND		

J11: G-PROBE(RS232)

Pin No.	Function	Pin No.	Function
1	5VDC	3	RXD
2	TXR	4	GND

JP1:PANEL VCC

Pin No.	Function	Pin No.	Function
1-2	12V	5-6	3.3V
3-4	5V		

DC characteristics.

Power Consumption	6	W Note1
Operation Temperation	0~70	℃
Storage Temperature	-20~85	℃

Note: This Value is for a/d board body.

OSD menu

Here are some instructions for you to use the OSD (On Screen Display). By pressing the "menu", you will see the below picture.

Timing shows resolution, H-frequency,and V-frequency of the panel.Version shows the firmware control version. This 2 information is not changeable by user.
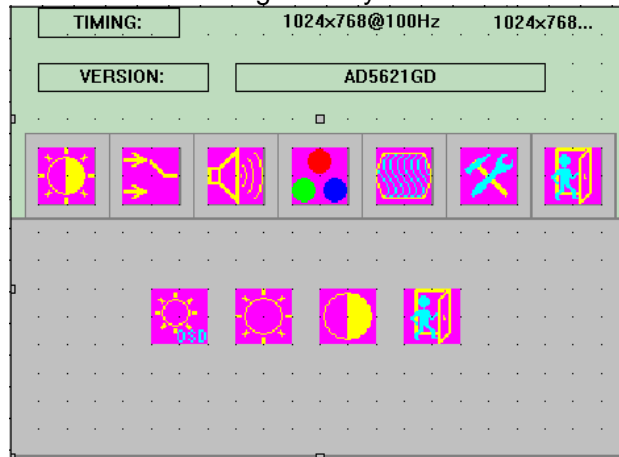
There are 7 sub pages inside the OSD manual, Brightness, Signal select, Sound, Color, Image, Tools, and Exit.

When you press "menu" button, you enter the "Brightness" sub page.   You will see 4 selections:

press ''menu''   press ''menu''   press ''menu''   press ''menu''

OSD Brightness:

press ''right'' key

press "menu" once, you can go into adjust the brightness.   Press "left" you can dim down the brightness to "0", while press "right" you can increase the brightness to "100".

Ambient light sensor: press this Icon, must to accompany with Litemax ambient light sensor to auto dimming.(OPTION)

Potentiometer: press this icon, adjust VR function.(OPTION)

Ambient light sensor with OSD offset: press this Icon

Press ''right'' key

Press 'menu'' once, you can adjust min. luminance to fit your application (OPTION)

Contrast: Press "menu" and "right" you can adjust the contrast from "0" to "100" by pressing the "left" and "right".

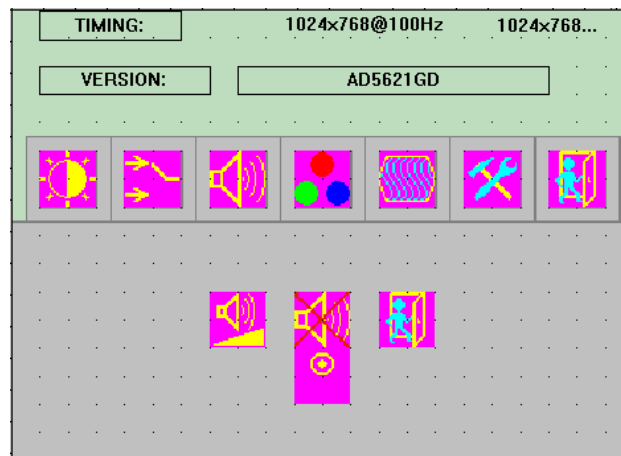**Exit:** You can exit this sub menu back to normal screen.

TIMING:		1024x768@100Hz		1024x768...
VERSION:		AD5621GD		
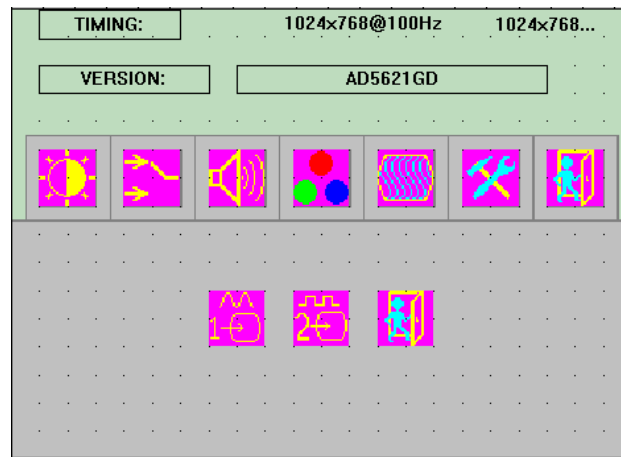
Analog: RGB/VGA INPUT

Digital: DVI input

Exit: You can exit this sub menu back to normal screen.

TIMING:		1024x768@100Hz		1024x768...
VERSION:		AD5621GD		

There are 3 options for "Sound" sub page.

Audio Volume: Audio volume adjustment.
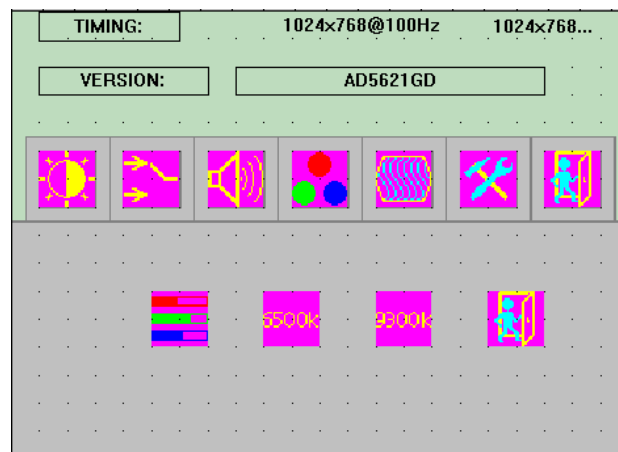
Mute: You can mute the speaker by pressing this option.

Exit: back to the normal screen.
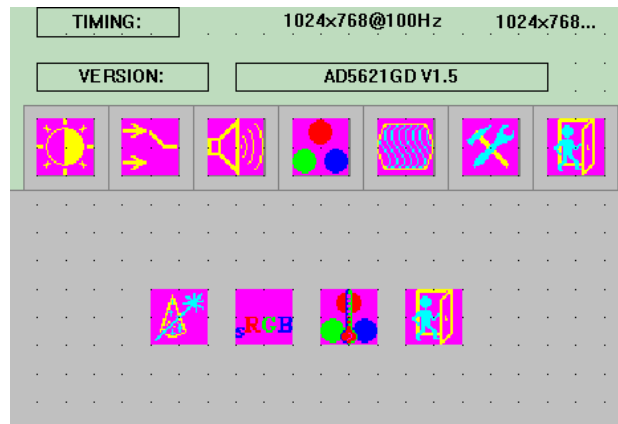
 Auto Color: by press this "Auto Color" option, you can get the optimal color performance.

 SRGB: Windows standard color setting.

 Color Tempture: You can have 3 options in this selection.

 Color Tempture User

 Color Tempture_6500K

 Color Tempture_93OOK

"user mode", "6500K" (Warm color scheme), "9300K (Cold color scheme).
Def ault is "user", and inside all "R", "G", and "B" are set "100"

 Exit: back to the normal screen.

Go into the "Image" page, you can see below picture.
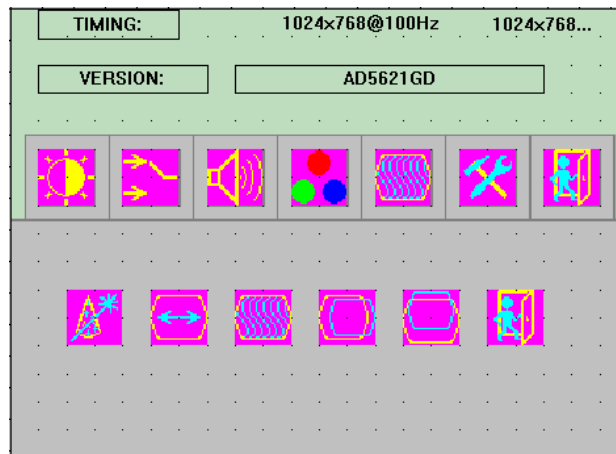
Auto just: Pressing this option, the AD5621 will adjust the optimal frequency of horizontal and vertical.   You will see "Auto tune…." On the screen for around 3 seconds.

Clock: If you are not satisfied about the Autotune result, you can adjust manually by "Clock".
The screen will be "wider" if you adjust this function.

Phase: If you see "double image" on characters, you can adjust "Phase" to make it perfect image.

HPos: You can shift the screen horizontally by this function.

Vpos: You can shift the screen vertically by this function.
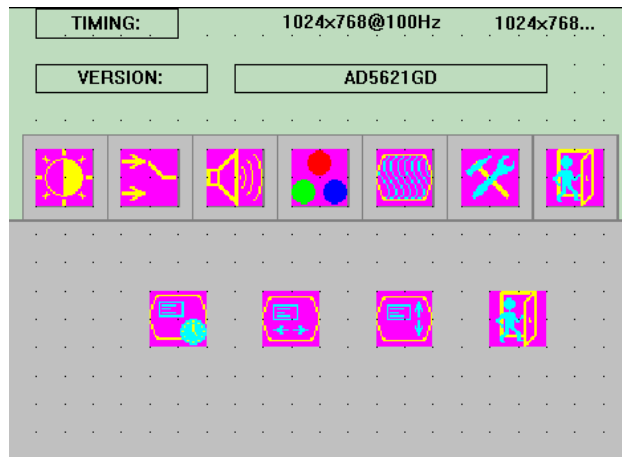
Exit: Back to normal screen.

On the "Tools" sub menu, you will see 5 icons.
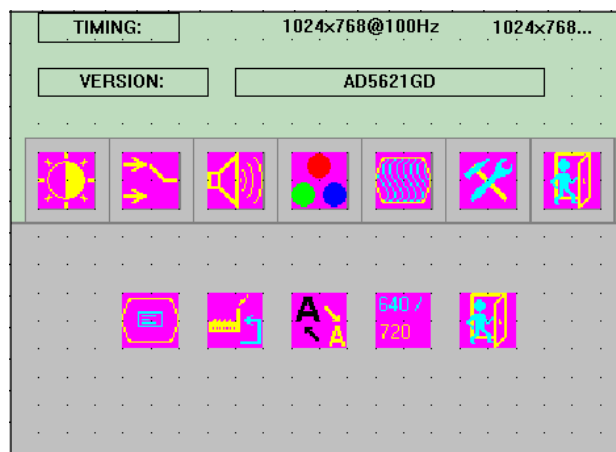
Osd Control: Select this option, you will see 4 more options:

| | TIMING: | | 1024×768@100Hz | 1024×768... |

| | VERSION: | AD5621GD |

Osd_time: You can selection the time of OSD from 2 sec. to 16 sec.   Ɔ

Osd_HPos: You can move the OSD horizontally over the screen.

Osd_VPos: You can move the OSD Vertically over the screen.

Exit: back to main menu.

Factory_Reset: By pressing this, the screen will be back to the factory setting on very beginning and lost all the personal settings.

**Sharpness:** You can make the characters looks sharper.

Dos_mode/Gxf_mode: Some old programs running over 640x400 and 720x400 (DOS Mode and graphics mode), you need to select this option manually.

Exit

Factory Burn-in mode: While your VGA cable is connected on the monitor, press "Menu" and Left <" simultaneously, you will see "BURN IN MODE" on the center of the screen for 3 sec. Then unplug the VGA cable, the screen will show Red, Green, Blue, White, and Black in sequence automatically.

You can plug in the VGA signal cable,   and re-plug the power connector to exit the burn-in mode.

BURN IN MODE
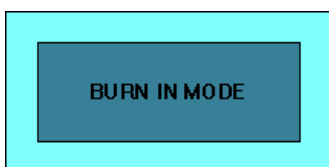
OSD Lock Function: It is possible to lock all the OSD buttons to prevent unauthorized changes to occur by pressing "Menu" and "right >" buttons simultaneously.   You will see the "lock" icon below on the center of the screen for 3 seconds.   If any button is pushed after the lock function is initiated, the below icon will appear on the screen.'

Keypad Lock
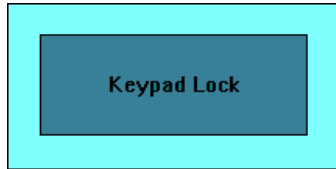
To release the OSD lock, press "Menu" and "Right >".   The below icon will appear on the center of the screen for 3 seconds.   Now all OSD keys are active again.

Keypad Unlock
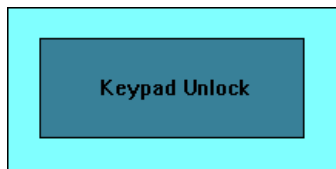
8.0 MECHANICAL DRAWING
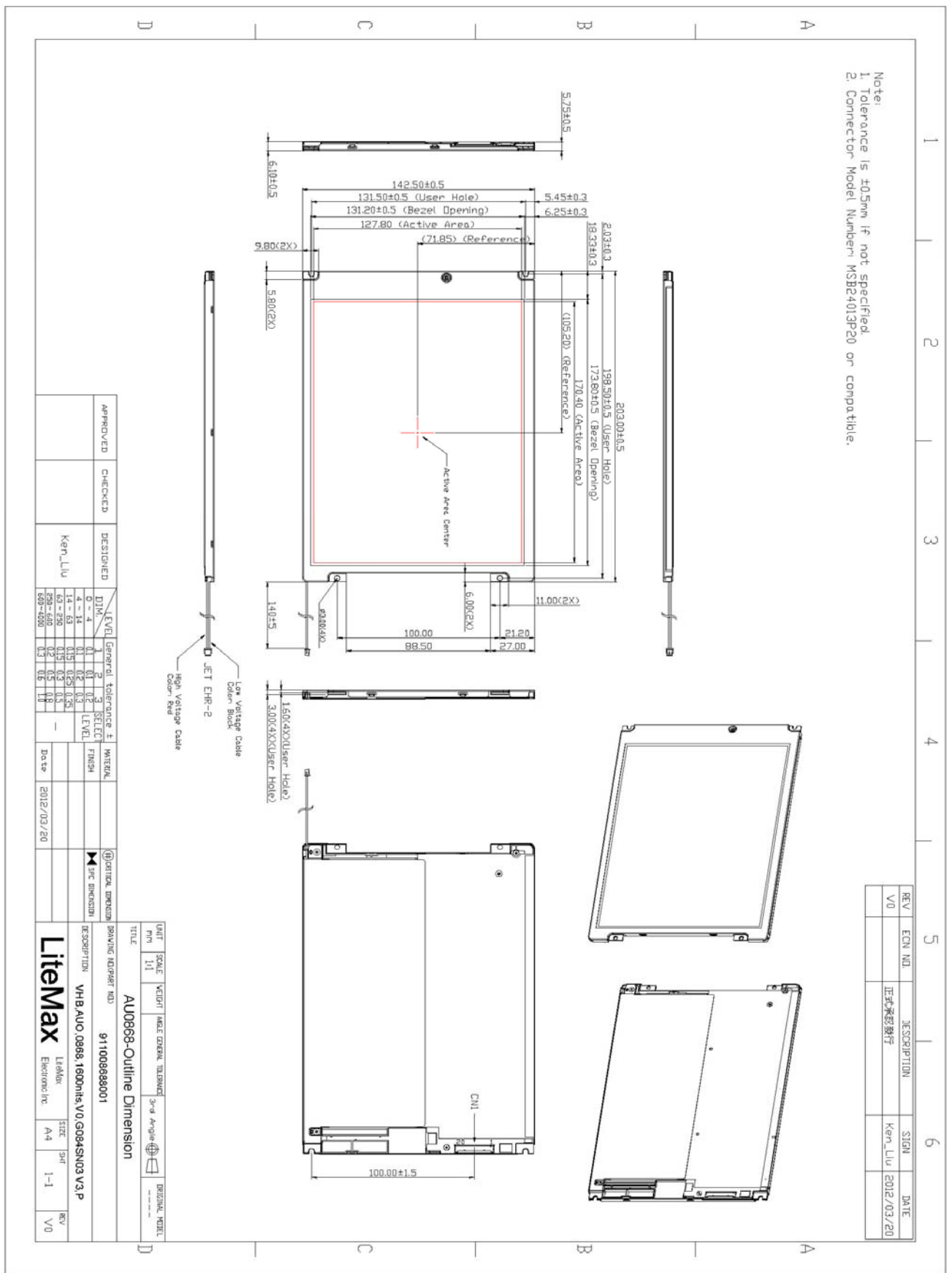
9.0 PRECAUTIONS

HANDLING PRECAUTIONS
(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
(9) Do not disassemble the module.
(10) Do not pull or fold the lamp wire.
(11) Pins of I/F connector should not be touched directly with bare hands.

STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
(3) It may reduce the display quality if the ambient temperature is lower than 10 ℃. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

OPERATION PRECAUTIONS
(1) Do not pull the I/F connector in or out while the module is operating.
(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.